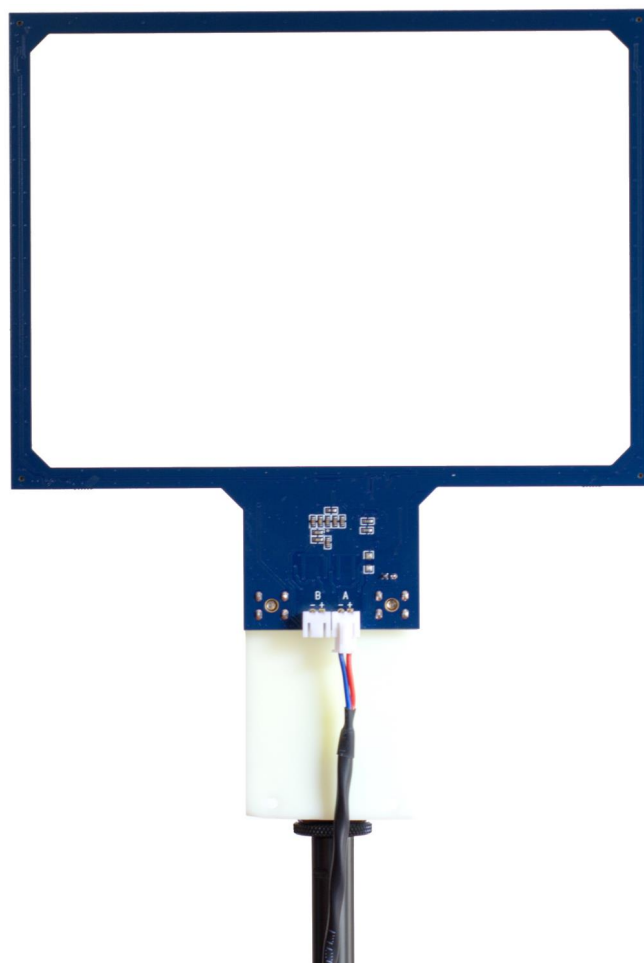


UMIK-X

DISTRIBUTED MICROPHONE ARRAY

User Manual



Revision history

Revision	Description	Date
0.2	Preliminary	15 March 2020
0.3	Second Preliminary	1 June 2020
0.4	Added screenshots for Mac	8 June 2020
0.5	Updated support links	6 July 2020
0.6	Added 4-channel firmware	21 August 2020
0.7	Diagram for 4-channel firmware	17 October 2020
0.8	Added UMA-XL module	6 December 2022
0.9	Added photos of UMA-XL	12 January 2023
1.0	Remove 4-channel firmware	20 January 2023

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IMPORTANT INFORMATION

Please read the following information before use. In case of any questions, please contact miniDSP via the support portal at support.minidsp.com.

Disclaimer/Warning

miniDSP cannot be held responsible for any damage that may result from the improper use or incorrect configuration of this product. Please read this manual carefully to ensure that you fully understand how to operate and use this product, as incorrect use or use beyond the parameters and ways recommended in this manual have the potential to cause damage to your audio system.

Please also note that many of the questions we receive at the technical support department are already answered in this User Manual and in the online [application notes](#) on the miniDSP.com website. So please take the time to carefully read this user manual and the online technical documentation. Thank you for your understanding!

Warranty Terms

miniDSP Ltd warrants this product to be free from defects in materials and workmanship for a period of one year from the invoice date. Our warranty does not cover failure of the product due to incorrect connection or installation, improper or undocumented use, unauthorized servicing, modification or alteration of the unit in any way, or any usage outside of that recommended in this manual. If in doubt, contact miniDSP prior to use.

FCC Class B Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Warning: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Notice: Shielded interface cable must be used in order to comply with emission limits.

Notice: Changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CE Mark Statement

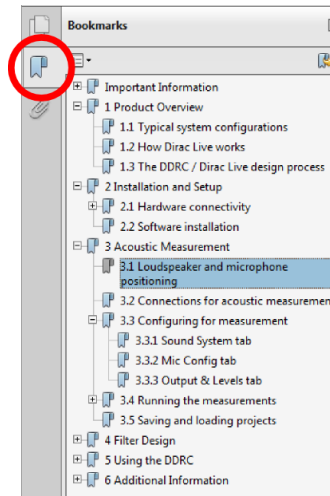
The UMIK-X has passed the test performed according to European Standard EN 55022 Class B.

A Note on this Manual

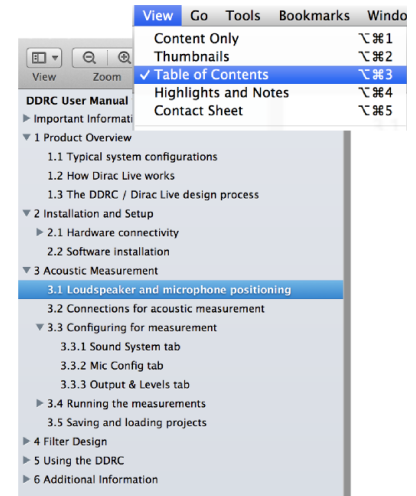
This User Manual is designed for reading in both print and on the computer. If printing the manual, please print double-sided. The embedded page size is 8 ½" x 11". Printing on A4 paper will result in a slightly reduced size.

For reading on the computer, we have included hyperlinked cross-references throughout the manual. In addition, a table of contents is embedded in the PDF file. Displaying this table of contents will make navigation much easier:

- In Adobe Reader on Windows, click on the “bookmarks” icon at the left. The table of contents will appear on the left and can be unfolded at each level by clicking on the “+” icons.
- In Preview on the Mac, click on the **View** menu and select **Table of Contents**. The table of contents will appear on the left and can be unfolded at each level by clicking on the triangle icons.



Adobe Reader on Windows



Preview on Mac

1 PRODUCT OVERVIEW

Thank you for purchasing a miniDSP UMIK-X distributed microphone array. The UMIK-X consists of one to four UMA-4 or UMA-XL microphone modules, each carrying up to four MEMS microphones. A separate interface enclosure, the USB-A2B, interfaces the A2B protocol used by the microphone modules to the USB interface of your computer.

Between four and 16 MEMS microphones can therefore be connected. The UMA-4 and UMA-XL modules are daisy-chained to each other using a single twisted-pair cable carrying the A2B protocol at 44.1 or 48 kHz.

Applications include environmental monitoring and distributed soundfield measurement. The distributed omnidirectional microphones in the array allow quick measurement and analysis in applications such as room and hall equalization and distributed subwoofer tuning.

The USB-A2B interface includes a stereo optical output to simplify generation of test audio signals.

The UMIK-X is compatible with the multi-channel measurement capability of Room EQ Wizard. A license for the multi-channel upgrade is included with your purchase of the UMIK-X.



The microphone modules include bare circuit boards with no environmental protection. They are intended for prototyping and indoor use. Outdoor use is not recommended, as exposure to moisture and dust may damage the modules.

2 HARDWARE CONNECTIVITY

2.1 UMA-4 MODULE

Figure 1 shows the physical structure of the UMA-4 microphone module. Four MEMS microphones are positioned in a rectangle at approximately 170 mm x 125 mm centers. Two lugs with screw threads are used for mounting to a microphone stand adapter (supplied). Channel numbering within each module is as shown. Headers for the two A2B ports A are located as shown. (A third header above one of the threaded lugs is not intended for end-user access.)

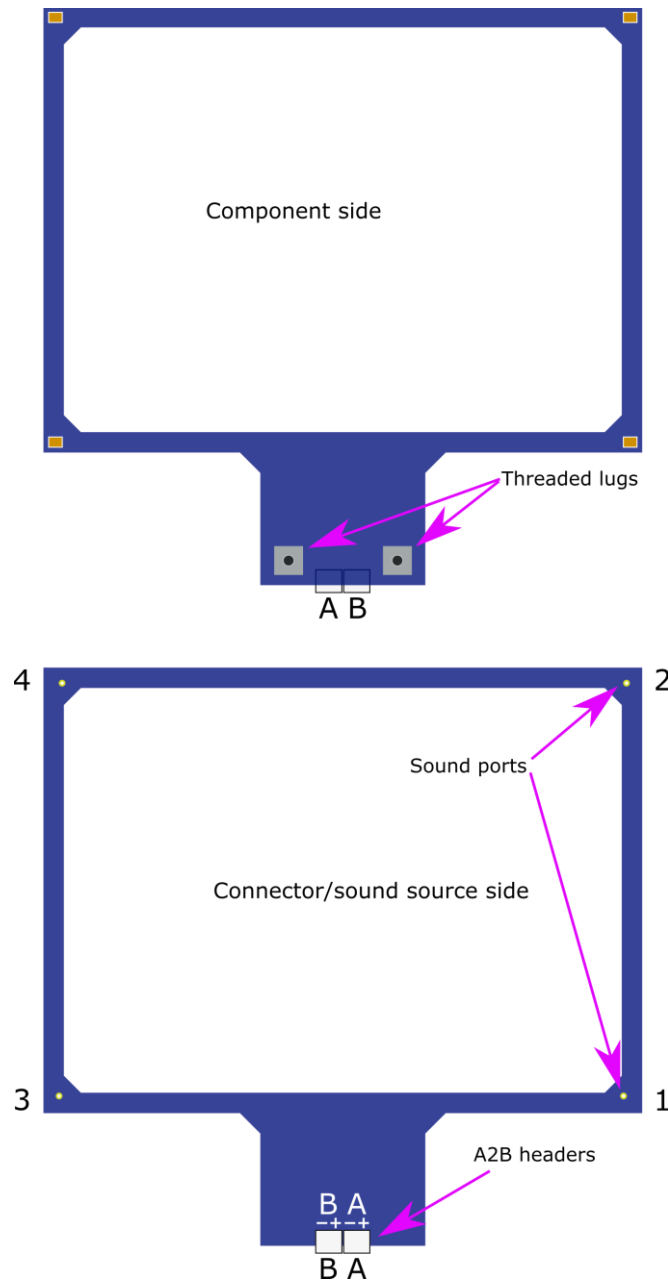


Figure 1. UMA-4 physical structure

Figure 2 shows a UMA-4 module with the various parts provided:

- The UMA-4 module itself.
- A twisted-pair cable for connecting modules and the USB-A2B interface.
- Two thumb screws to fasten the UMA-4 to the stand adapter.
- Two thread adapters: $\frac{1}{4}$ " to $\frac{3}{8}$ " and $\frac{3}{8}$ " to $\frac{1}{2}$ ". These enable the UMA-4 to be mounted to a wide variety of camera and microphone stands.
- The stand adapter. One or two UMA-4 modules can be mounted to the adapter.

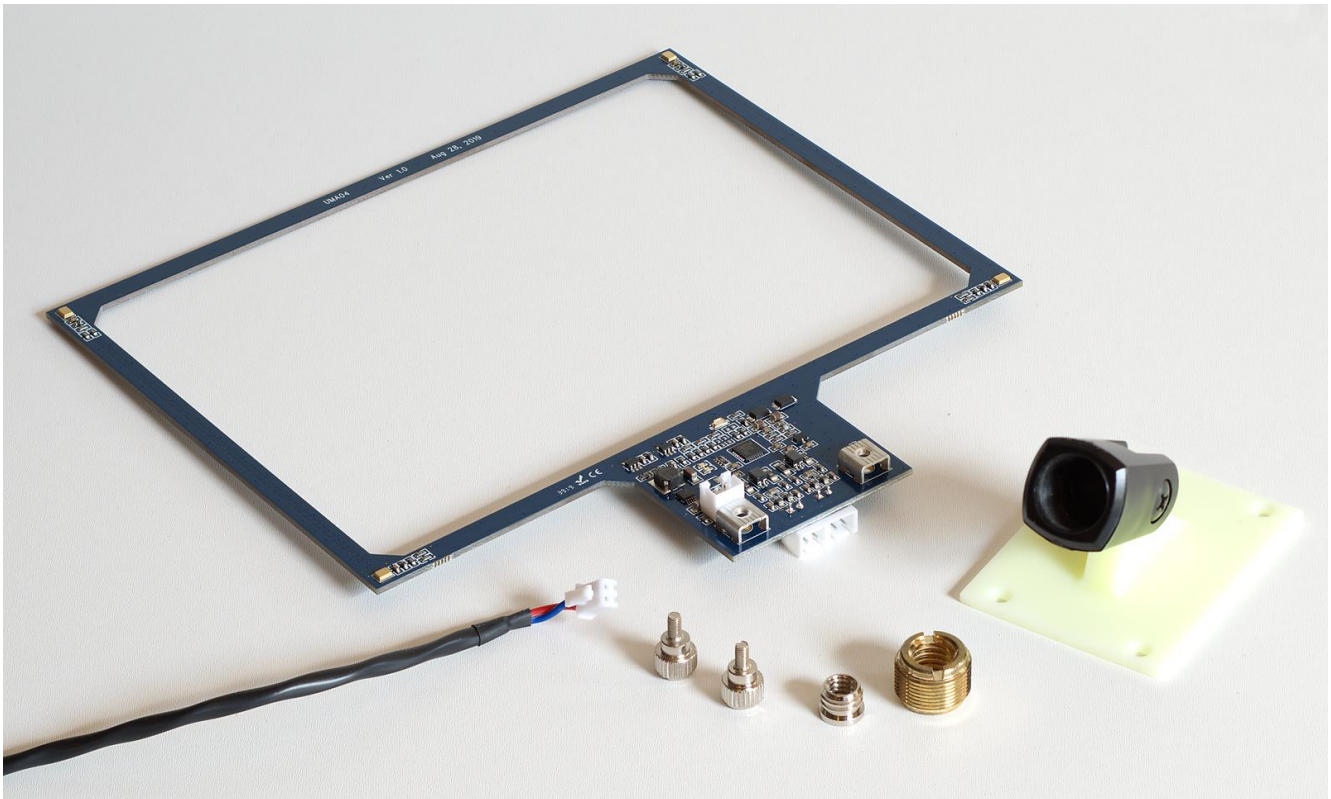


Figure 2. UMA-4 microphone module and provided parts

Figure 3 illustrates a single UMA-4 module mounted to the stand adapter, which is in turn mounted onto a microphone stand. When using a single module, the twisted pair cable to the USB-A2B interface plugs into the “A” jack as shown.

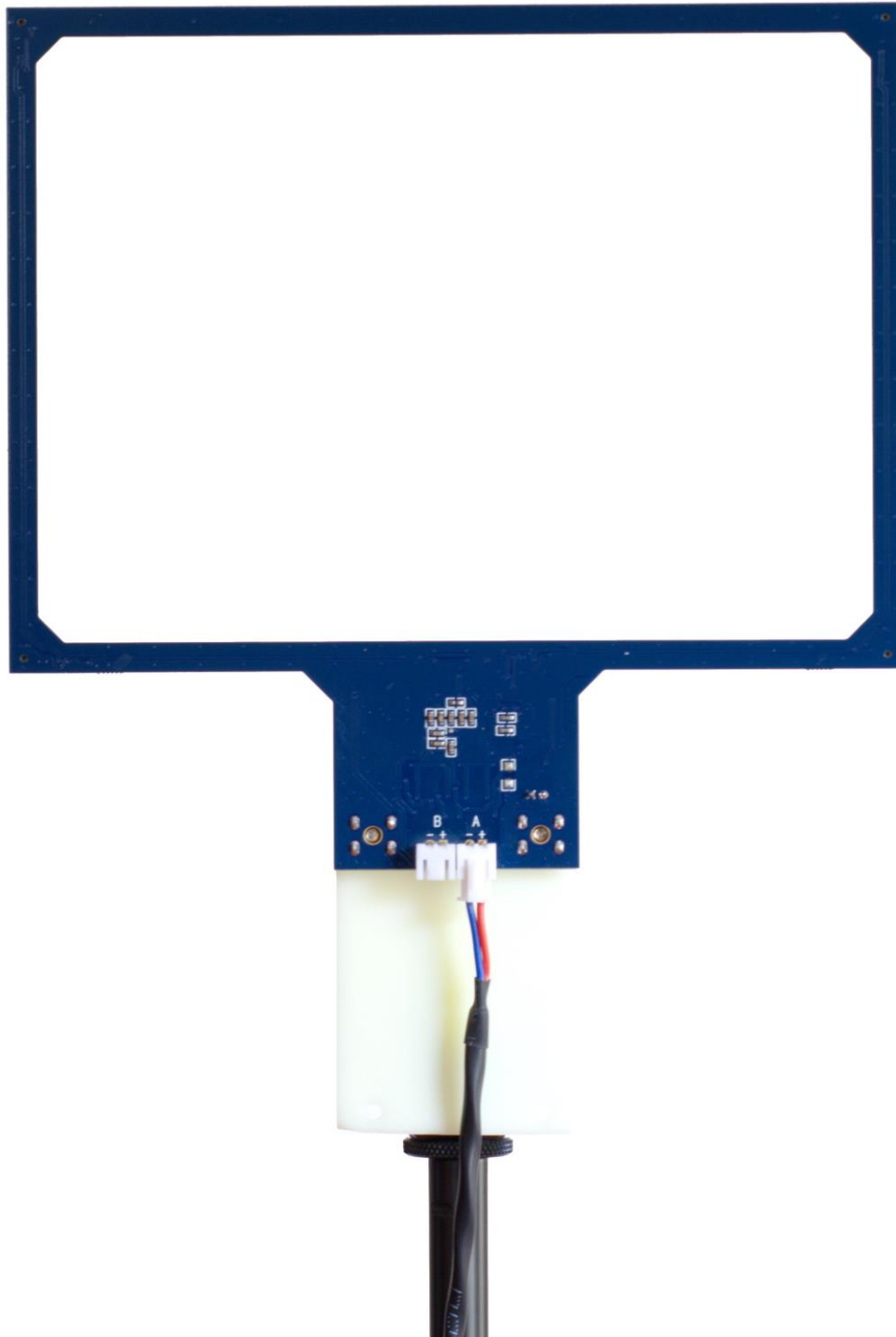


Figure 3. Single UMA-4 module on microphone stand (connector/sound source side)

Each pair of UMA-4 modules is provided with a short 8 cm twisted-pair cable. This is used when mounting two modules onto a single stand, as shown in Figure 4.

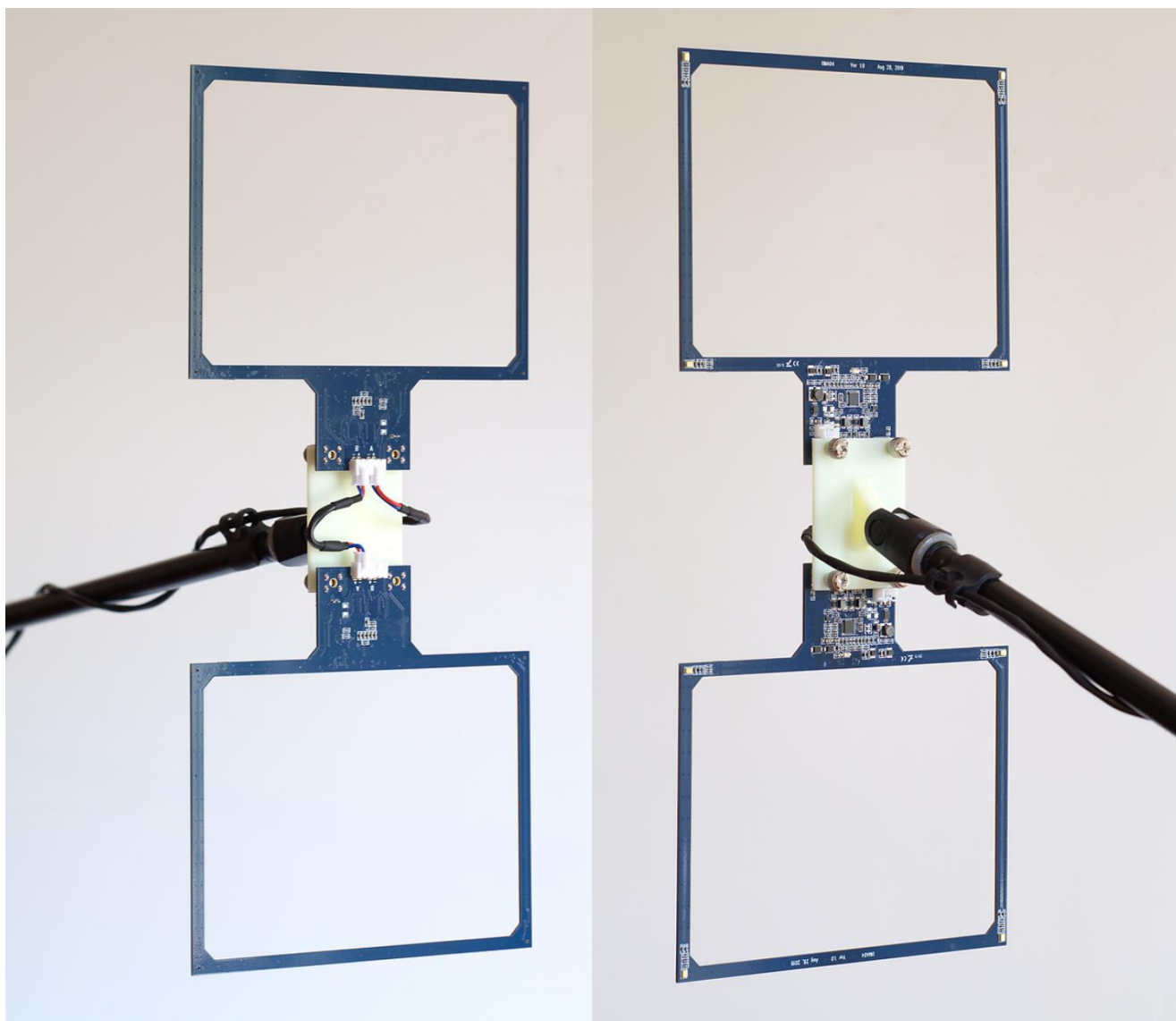


Figure 4. Dual UMA-4 modules mounted on a single stand with boom arm

2.2 UMA-XL MODULE

The UMA-XL module consists of a small enclosure and four small circuit boards each containing a single MEMS microphone. The UMA-XL module has four USB-C connectors on one side, which are cabled to the MEMS microphone boards. The other side has two A2B ports for connection to the USB-A2B interface.

Figure 5 shows the UMA-XL module from both front and back, together with four MEMS microphone boards.

When connecting the MEMS boards, note the number (0 or 1) printed on the back of the board. If the board has 0 printed on it, connect it to port A0 or B0. If the board has 1 printed on it, connect it to port A1 or B1.



Figure 5. UMA-XL module enclosure (shown from both front and back) with four MEMS microphone boards

2.3 USB-A2B INTERFACE

Figure 6 shows the panel connections for the USB-A2B interface. The **Optical IN** is not active. **Optical OUT** is typically used to output test signals. The USB-A2B interface requires power from an external 5V 2A supply with a micro-USB Type B connector.

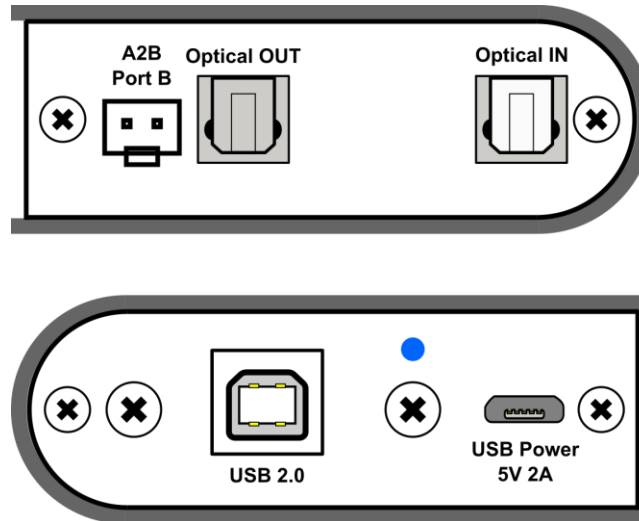


Figure 6. USB-A2B interface

2.4 UMIK-X SYSTEM CONNECTIONS

Figure 7 illustrates how the UMIK-X is connected to multiple UMA-4 modules, while Figure 8 illustrates connections when using two UMA-XL modules (up to four modules can be used, but this is not shown in the diagram).

When connecting to UMA-XL, note the number (0 or 1) printed on the back of the MEMS board. If the board has 0 printed on it, connect it to port A0 or B0. If the board has 1 printed on it, connect it to port A1 or B1.

Here is a standard procedure for getting connected:

1. Connect a free USB (2.0 compatible) port on your computer to the Type B port on the USB-A2B.
2. Connect the “B” A2B port on the USB-A2B to the “A” port on the first UMA-4 or UMA-XL module.
3. Connect the “B” port of the first UMA-4 or UMA-XL module to the “A” port on the second module (if present).
4. Repeat for the third and fourth modules (if present).
5. Plug a 5V 2A USB power supply to mains power. Connect the USB port from the power supply to the micro USB power port on the interface.



All microphone modules must be connected before applying power to the USB-A2B interface, otherwise the modules will not be recognized.



The power supply must supply adequate power to the modules. We recommend using a dedicated 5V DC power supply with at least 2 Amp output capability, and not using e.g. a computer USB port to supply power.

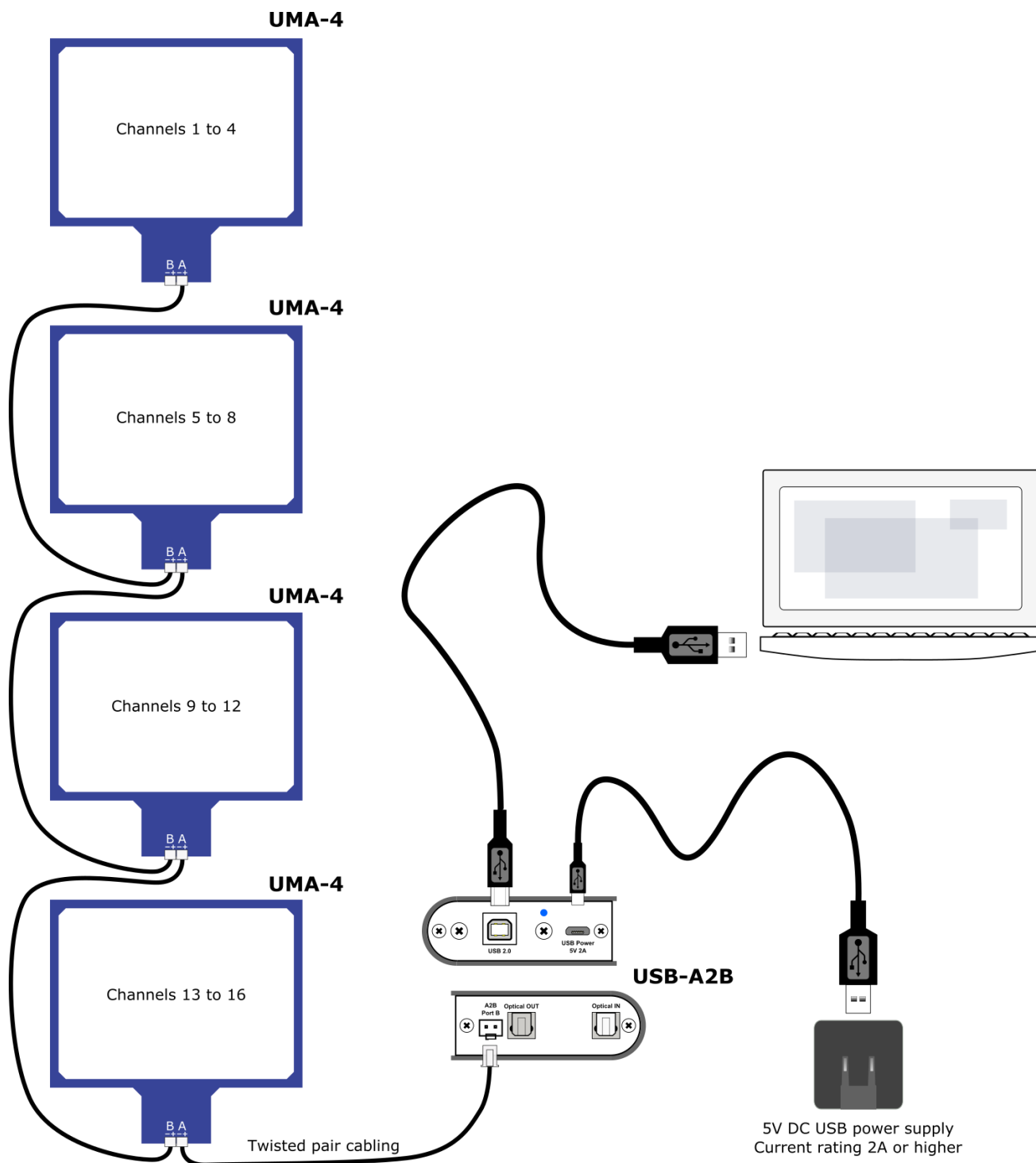


Figure 7. UMIK-X connections when using four UMA-4 modules (total 16 channels)

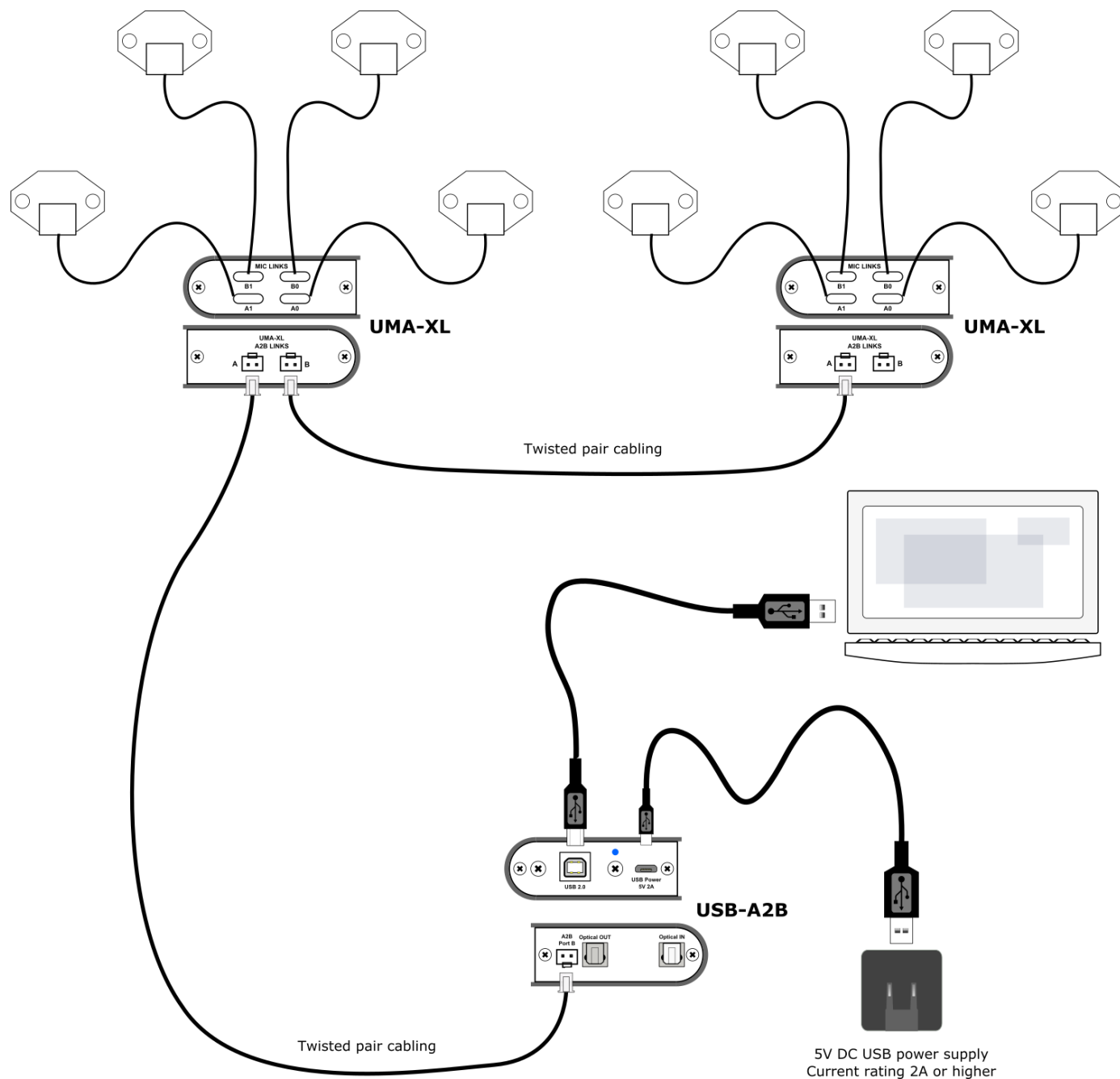


Figure 8. UMIK-X connections when using two UMA-XL modules (total 8 channels in this example, up to 16 supported)

3 INSTALLATION AND CONFIGURATION – WINDOWS

For use with Windows, the miniDSP driver must be installed. You will also need to download the software package if there is a firmware upgrade.

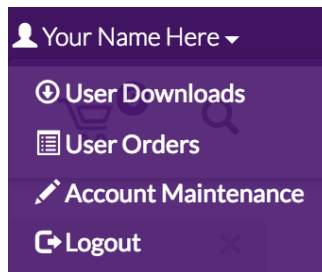
3.1 DOWNLOAD

If you purchased your product directly from miniDSP, your software will be available from the [User Downloads](#) section of the miniDSP website when your order ships. You will need to be logged into the website with the account you created when purchasing to access the download.

If you purchased your product from a miniDSP dealer, you will receive a coupon together with the product. Redeem this coupon and select the Plugin Group “UMIK-X” at the link below:

- <https://www.minidsp.com/support/redeem-coupon>

The User Downloads link is visible from the dropdown menu at the top right of the website page:



Navigate to the **UMIK Series / AmbiMIK Series** section then **UMIK-X**, and download the zip file under the heading **UMIK-X Driver and Firmware**. Unzip the downloaded file by right-clicking on it and selecting “Extract All...”.

3.2 USB DRIVER INSTALLATION

The USB driver enables Windows to stream audio to the UMIK-X. In addition, it installs a control panel to help manage the UMIK-X.

To install the driver, go to the **WinDrivers** folder of the installation download and double-click on the installer:

- **miniDSP_UAC2_v5.20.0_2021-07-24_setup.exe**

(The version number embedded in the filename may be different.)

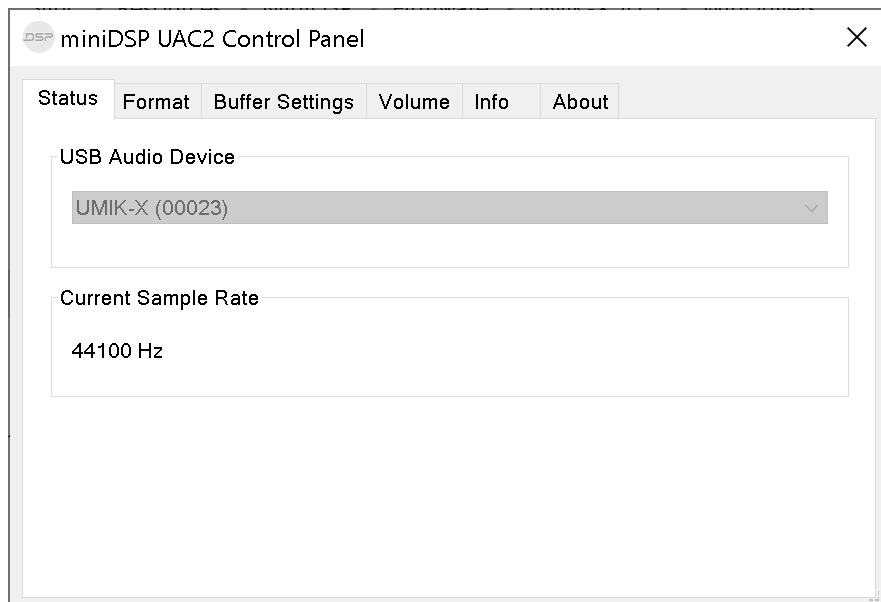
We recommend accepting the default installation location. Once the driver installation completes, click the **Finish** button.

3.3 UAC2 CONTROL PANEL

To configure the UMIK-X, open the **miniDSP UAC2 Control Panel** (from Start Menu -> miniDSP Ltd). It has several tabs.

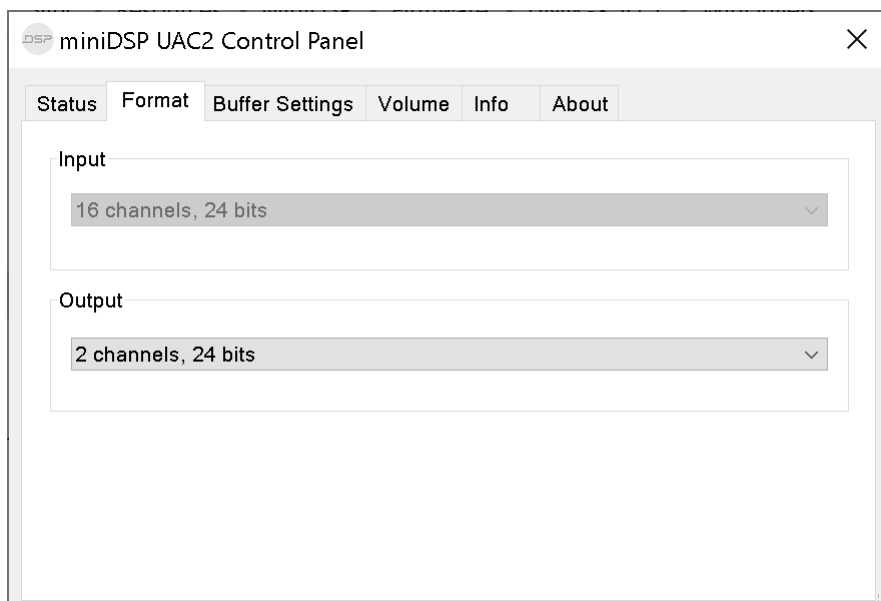
Status

This tab shows the current sample rate of the UMIK-X. This setting cannot be changed in the Control panel, but simply reflects the current sample rate of the UMIK-X.



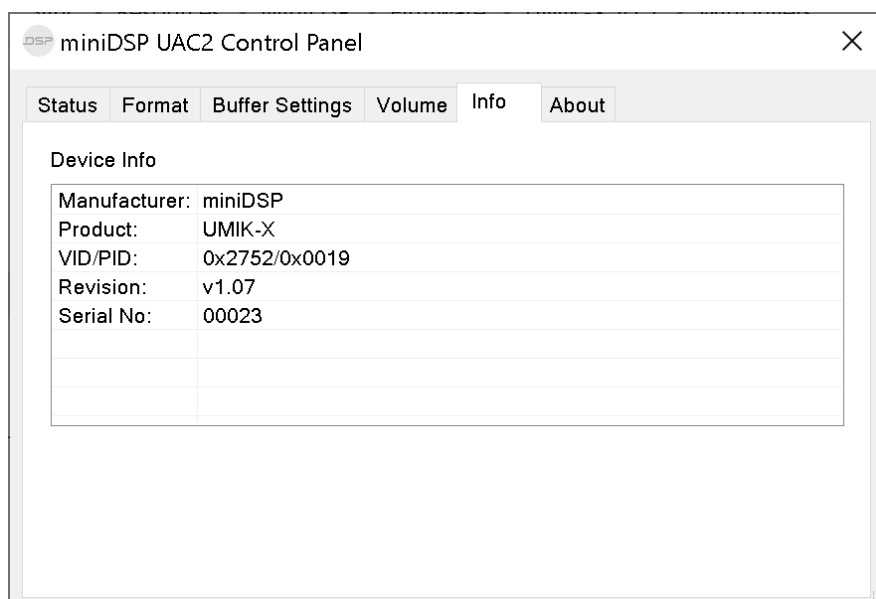
Format

This tab shows the input and output channel word lengths:

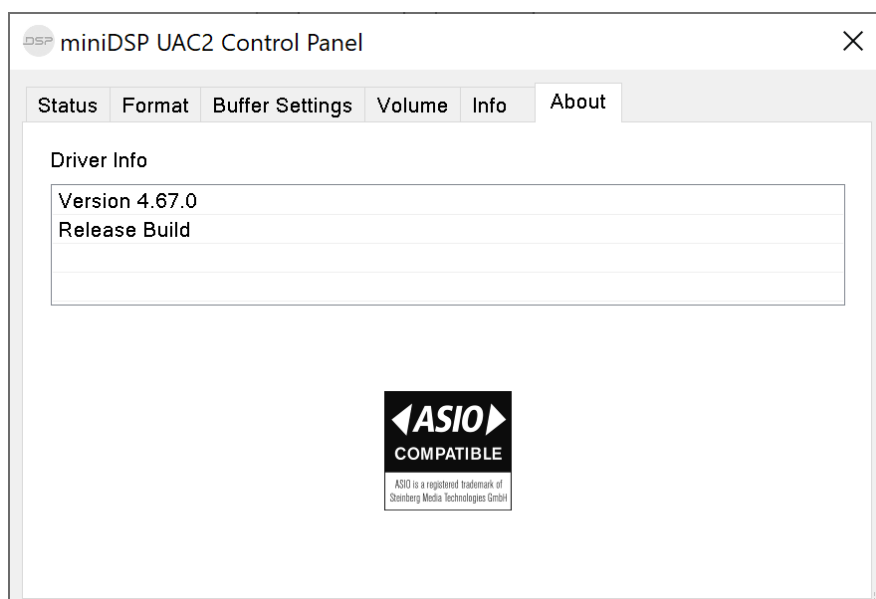


Info

This pane shows information about the UMIK-X.



About



4 INSTALLATION AND CONFIGURATION – MAC OS X

Mac OS X / macOS has native support for USB Audio class 2.0 devices, so no driver installation is required. You may need to download the software package to update firmware.

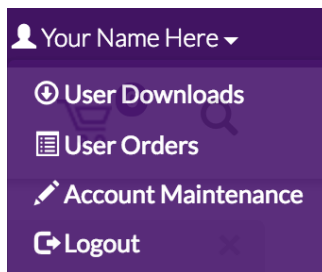
4.1 DOWNLOAD

If you purchased your product directly from miniDSP, your software will be available from the [User Downloads](#) section of the miniDSP website when your order ships. You will need to be logged into the website with the account you created when purchasing to access the download.

If you purchased your product from a miniDSP dealer, you will receive a coupon together with the product. Redeem this coupon and select the Plugin Group “UMIK-X” at the link below:

- <https://www.minidsp.com/support/redeem-coupon>

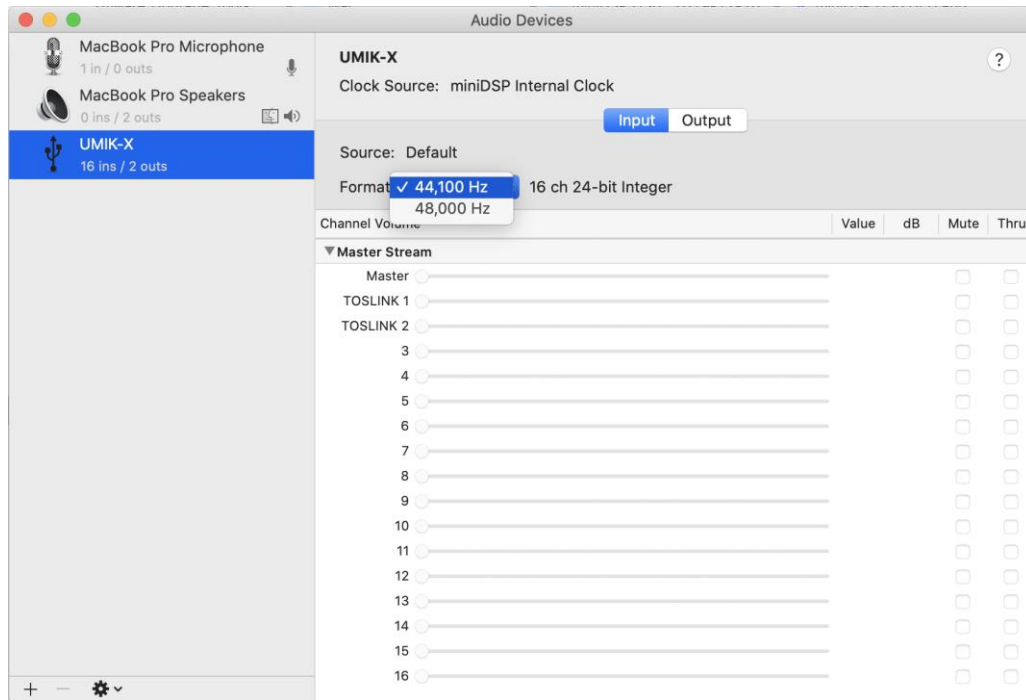
The User Downloads link is visible from the dropdown menu at the top right of the website page:



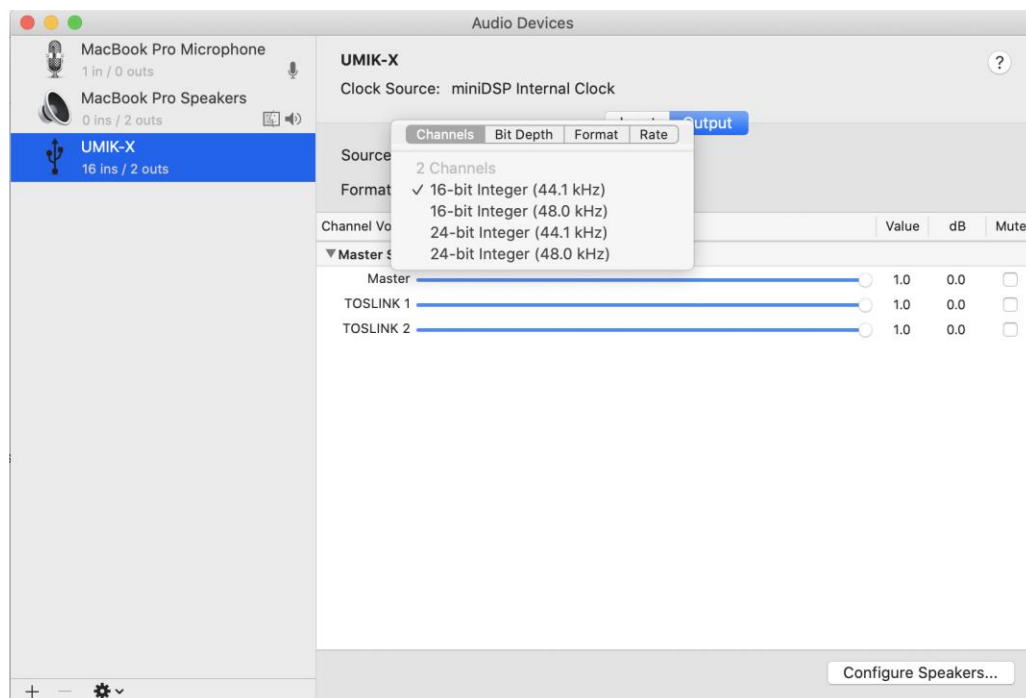
Navigate to the **UMIK Series / AmbiMIK Series** section then **UMIK-X**, and download the zip file under the heading **UMIK-X Driver and Firmware**. Unzip the downloaded file by double-clicking on it.

4.2 CONFIGURATION IN AUDIO MIDI SETUP

Open the program **Audio MIDI Setup** (in **Applications->Utilities**). Click on the device UMIK-X that appears in the list on the left. This will display the input and output channels. The **Format** drop-down menu will show the supported sample rates. For the input channels:



For the output channels:

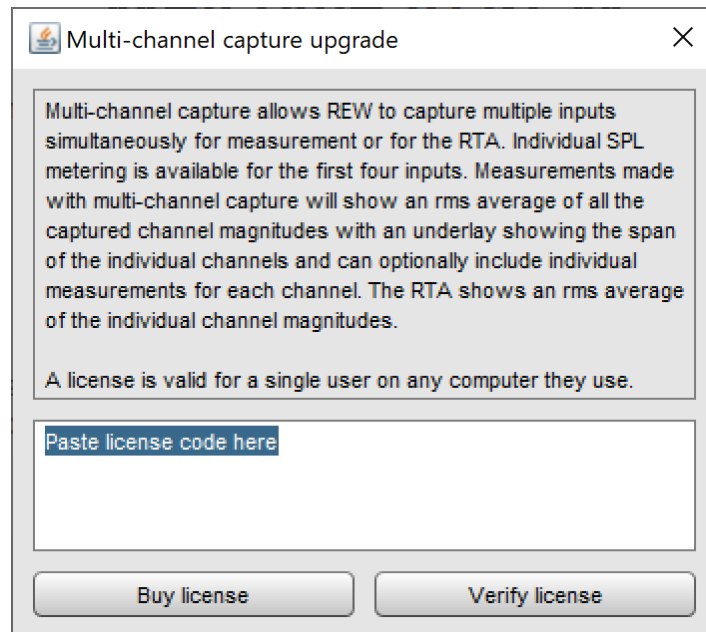


5 ROOM EQ WIZARD MULTICHANNEL MEASUREMENT

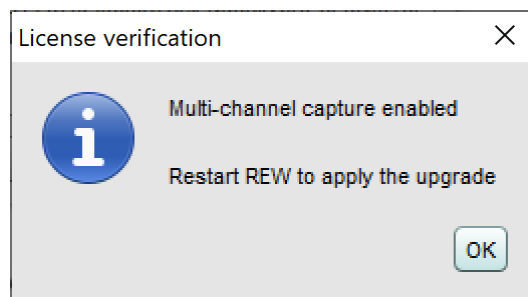
The UMIK-X is provided with a license for the multichannel measurement feature of Room EQ Wizard (REW).

5.1 ENABLING THE LICENSE

To enable your license, drop down the Upgrades menu and select Multichannel measurement. Paste in your license code.



You will need to quit REW and start it again for the license to take effect:

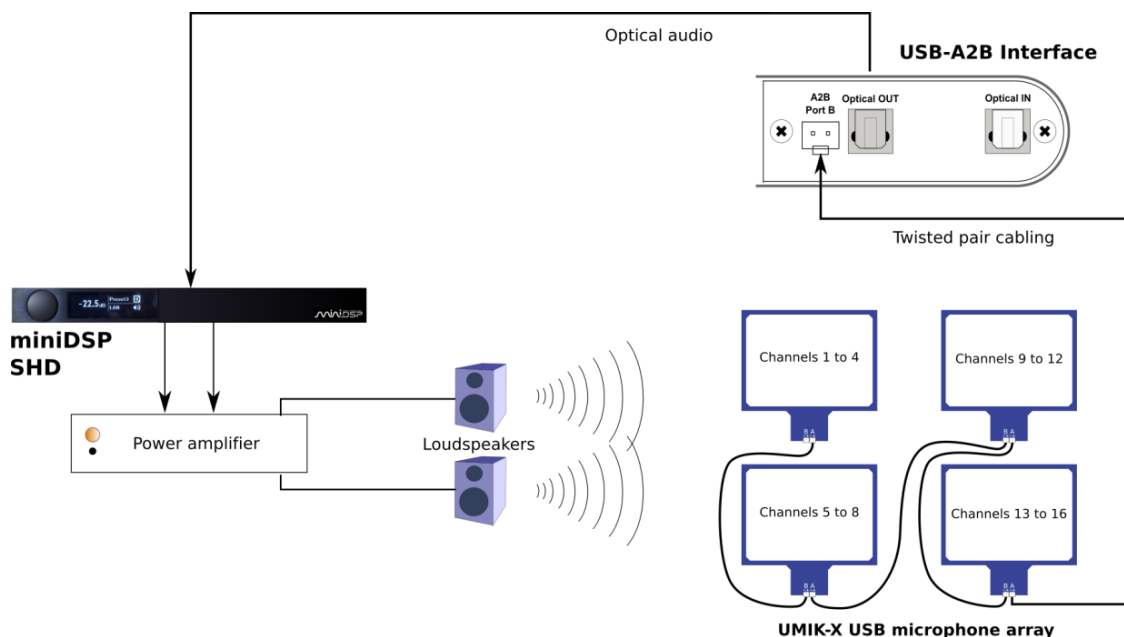


5.2 CONFIGURING REW PREFERENCES – WINDOWS

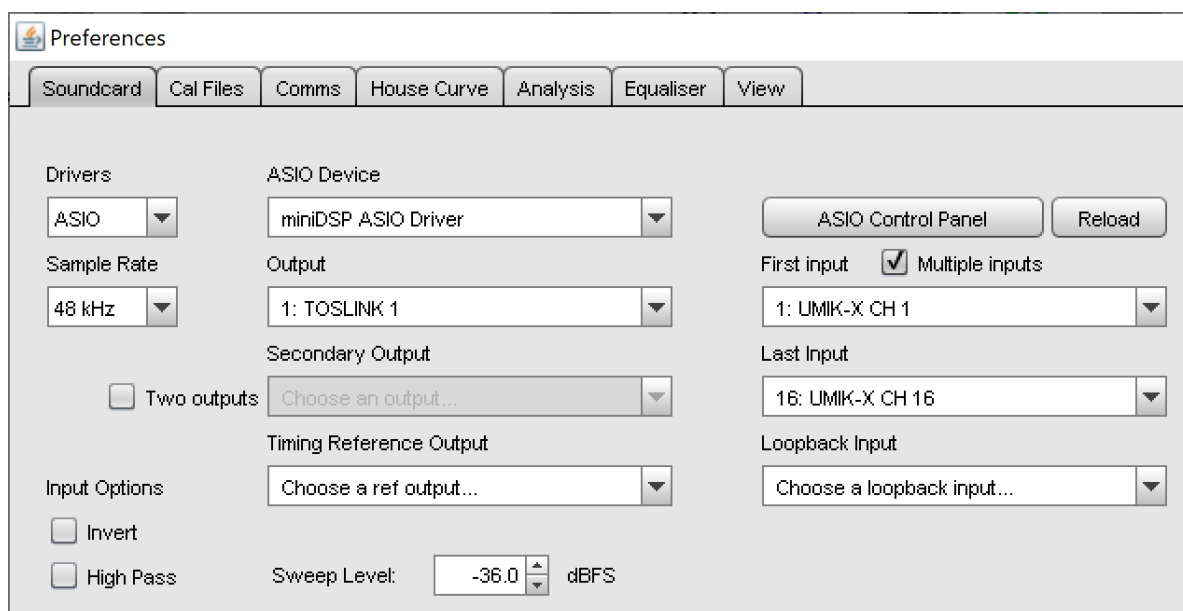
To use the UMIK-X, open the Preferences window (the wrench/spanner icon at top right). You will need to decide on how to allow REW to output test signals as well as to select the UMIK-X for audio input.

5.2.1 miniDSP ASIO driver

The A2B interface has a standard optical stereo output (TOSLINK). The simplest method of sending test audio from REW is to connect this optical output to a device that has an optical input. For example:



In this case, you can use the miniDSP ASIO driver directly. In the REW Preferences window, first select ASIO under **Drivers** (top left of Preferences screen). Then select the miniDSP ASIO Driver under **ASIO Device**. Select the input and output channels as shown:

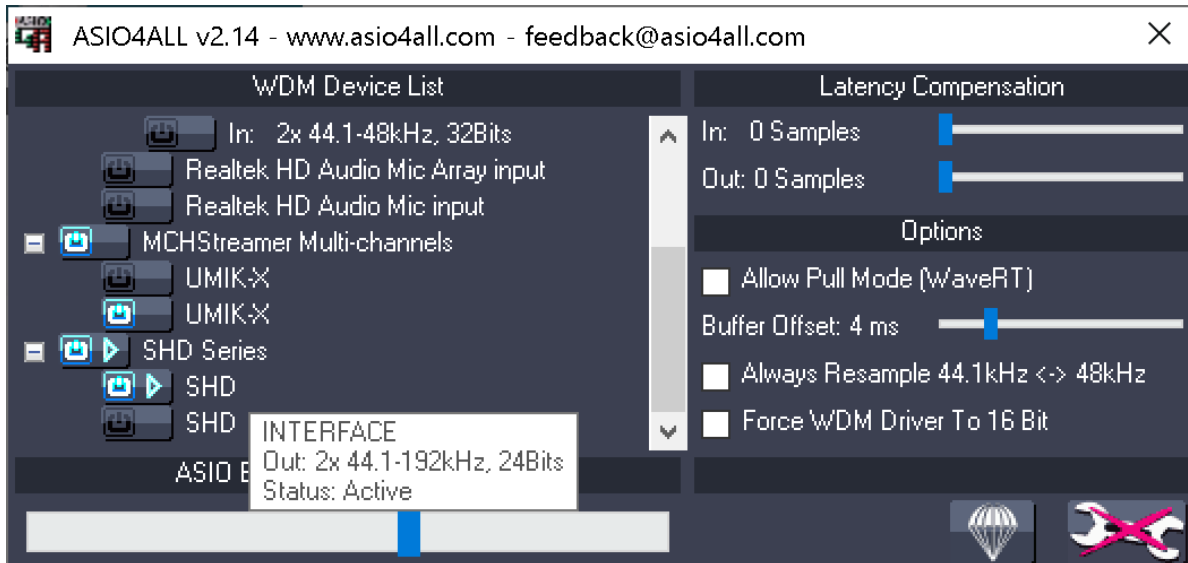


5.2.2 ASIO4ALL

If you need to output audio via some other audio interface on your PC, you will need to use ASIO4ALL¹. First download it from <http://www.asio4all.org> and install it.

In the REW Preferences window, select ASIO as the “Drivers” option, then ASIO4ALL as the ASIO Device.

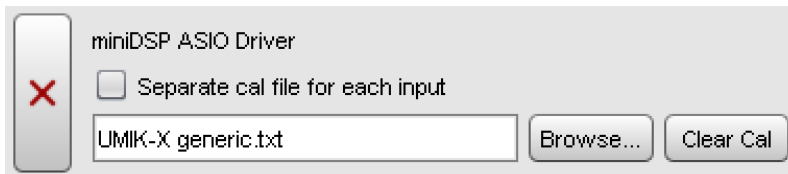
Click on the ASIO Control Panel button. Click on the wrench/spanner icon at the lower right to enable advanced mode. Then select the desired input and output devices from the list on the left. Disable unused devices. In this example, we are using the miniDSP SHD as the output device and the UMIK-X as the input device:



Note that there are two entries for the UMIK-X and the SHD, as both have input and output channels. Hover your mouse over them to see which is which, and enable the input channels of the UMIK-X and the output channels of the SHD (or other output device).

5.2.3 Selecting the calibration file

The UMIK-X comes supplied with a generic calibration file. Download it from the UMIK-X page. Use the **Cal File** tab of REW Preferences to select it as the calibration file for the miniDSP ASIO driver or for ASIO4ALL.



Note that – even with the calibration file – the UMIK-X does not have same level of accuracy as the UMIK-1. The polar response is not symmetrical at high frequencies. The benefit of the UMIK-X is its ability to make multiple measurements at the same time. This can also mean that repeated measurements are more accurate as there is no need to move a single microphone to different locations.

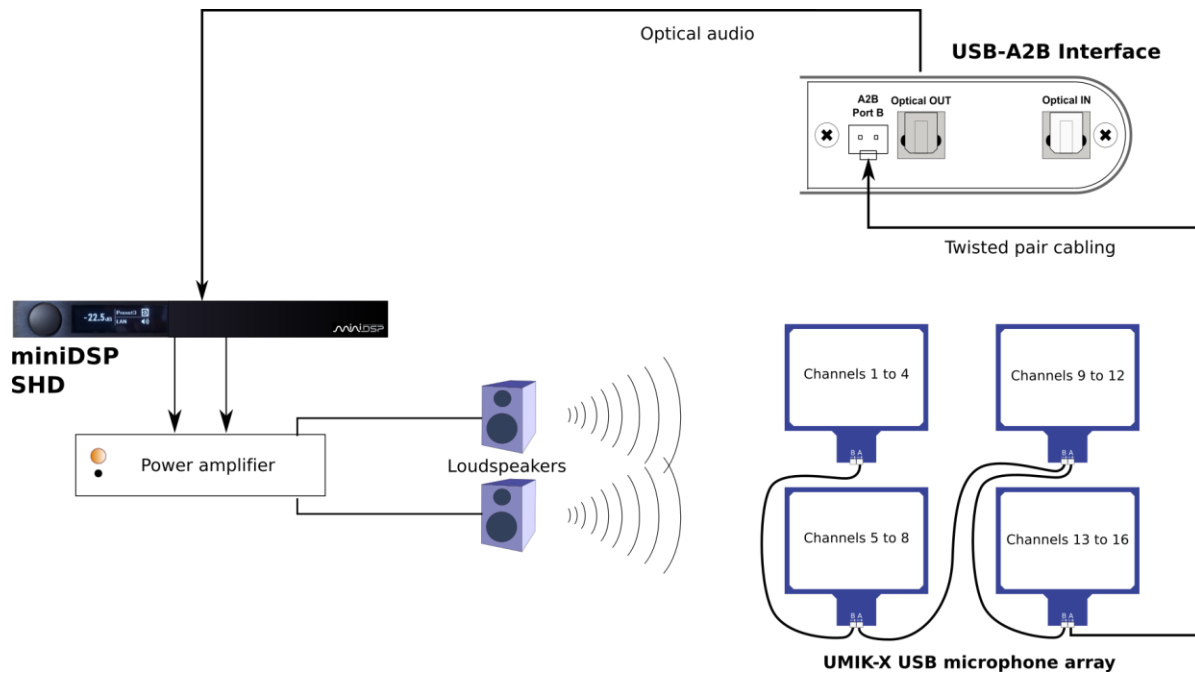
¹ FlexASIO is an alternative. See [this app note on our website](#) for an example of FlexASIO use.

5.3 CONFIGURING REW PREFERENCES – MACOS/OS X

Open the Preferences window (the wrench/spanner icon at top right).

5.3.1 Select input and output

The A2B interface has a standard optical stereo output (TOSLINK). The simplest method of sending test audio from REW is to connect this optical output to a device that has an optical input. For example:



In this case, select the UMIK-X for both input and output:

Sample Rate	Output Device	Buffer	Input Device	Buffer
48 kHz	UMIK-X	32k	UMIK-X	32k
	Output		First input ☒ Multiple inputs	
	UMIK-X	L	UMIK-X	1
	Timing Reference Output	L	Last Input	16
			Loopback Input	2

If you want to send audio from your Mac via a different device, select it as the output device. For example, to send audio over USB to a miniDSP SHD processor:

Sample Rate 48 kHz	Output Device SHD	Buffer 32k	Input Device UMIK-X	Buffer 32k
	Output SPEAKER	L	First input ☒ Multiple inputs UMIK-X	1
	Timing Reference Output L		Last Input 16	
			Loopback Input 2	

5.3.2 Selecting the calibration file

The UMIK-X comes supplied with a generic calibration file. Download it from the UMIK-X page. Use the **Cal File** tab of REW Preferences to select it:



UMIK-X UMIK-X

☐ Separate cal file for each input

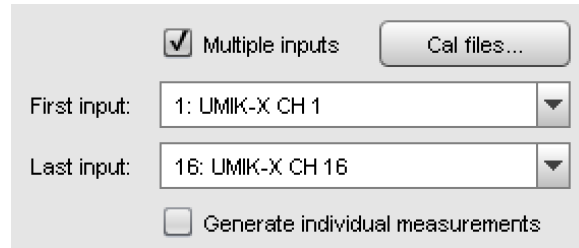
UMIK-X generic.txt

Browse... Clear Cal

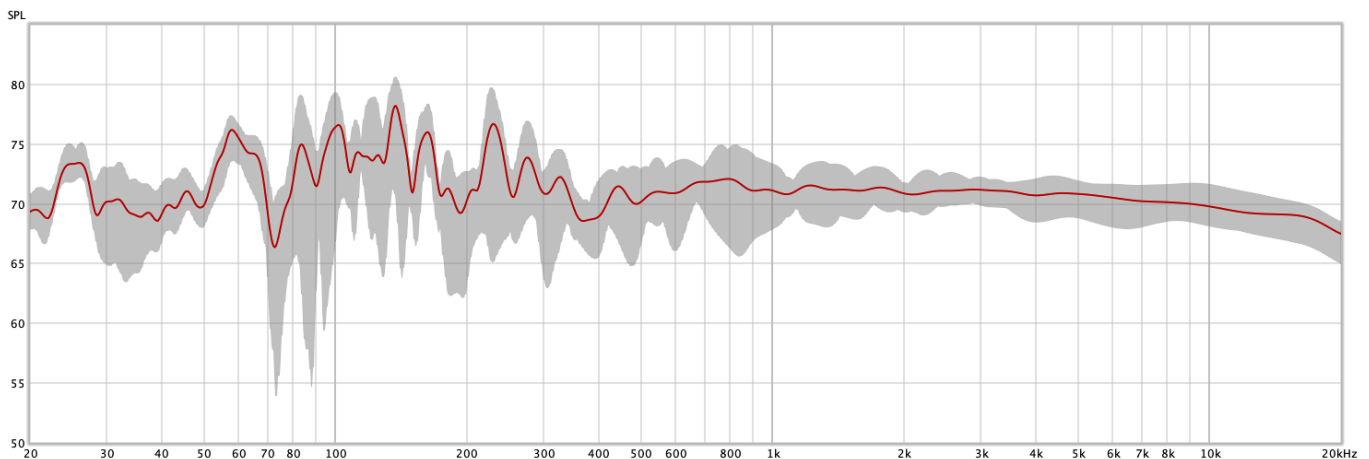
Note that – even with the calibration file – the UMIK-X does not have same level of accuracy as the UMIK-1. The polar response is not symmetrical at high frequencies. The benefit of the UMIK-X is its ability to make multiple measurements at the same time. This can also mean that repeated measurements are more accurate as there is no need to move a single microphone to different locations.

5.4 RUNNING A MULTICHANNEL MEASUREMENT

Click on the Measure button. At the lower right of the measurement window, check that “Multiple inputs” is selected and that your desired range of channels is selected.

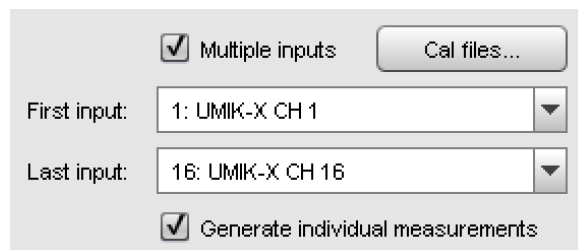


If “Generate individual measurements” is **not** selected, as shown above, you will get a single measurement that shows the range covered by all the measurements, and the average of all measurements:



The usual graph display controls work on this graph, such as limits and smoothing. (The example above uses “Var smoothing.”)

If “Generate individual measurements” **is** selected, each microphone will produce a separate measurement. In addition, the same measurement that shows the range covered by all the measurements and their average will be produced. (In other words, up to 17 individual measurement graphs will be produced from one sweep.)



Measurement of all 16 channels may not always be desired, in which case a smaller number of channels can be measured. For example, to measure using the microphones on just one module (channels 9 through 12):

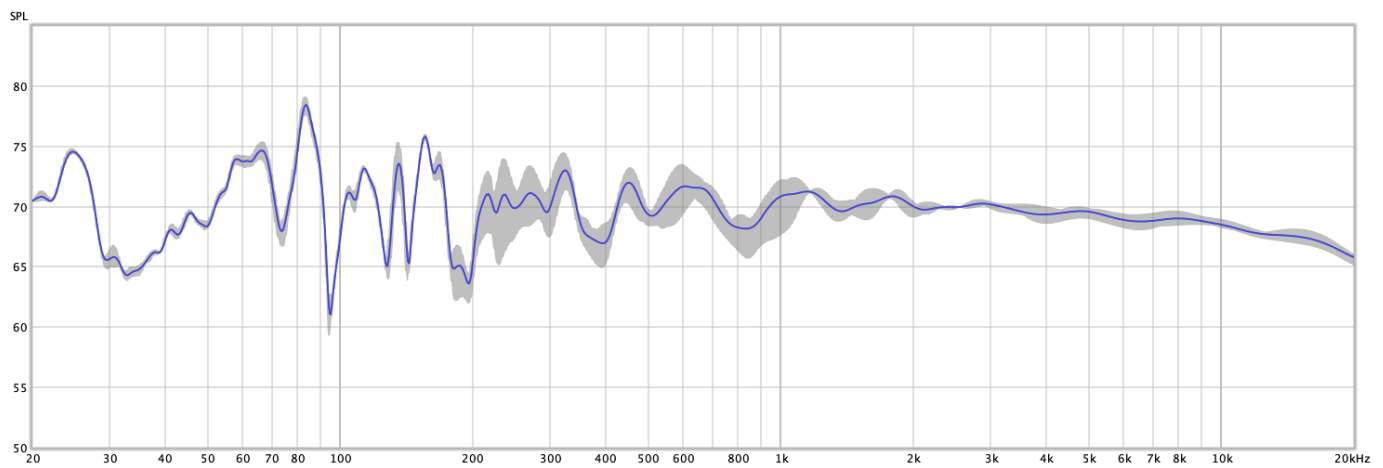
☒ Multiple inputs
 Cal files...

First input:

Last input:

☒ Generate individual measurements

Here is the combined measurement in this case. There is much less variation than the 16-channel example because the microphones on a single module are relatively close together.



Note: when choosing channels, remember that channel 1 is “furthest” from the computer. See Figure 7.

6 ADDITIONAL INFORMATION

6.1 SPECIFICATIONS

6.1.1 USB-A2B interface

USB streaming engine	XMOS Multicore USB audio processor for UAC2 streaming
USB audio capabilities	USB audio recording for up to 16ch audio channels: driverless under macOS and Linux, custom ASIO drivers provided for Windows 10 and 11
Resolution / Sample rate	24-bit @ 44.1/48 kHz
Analog Devices A2B link	Multichannel audio link via A2B protocol, up to 15m between UMA-4 modules and up to 40m total cable length. (Note: the cables provided in the package are a maximum of 5 meters length.)
Toslink	Toslink Out: Stereo link to Playback system / Toslink In: No enabled
LED	Power/Active link indication
Power supply	Requires 5V USB power supply with current rating of 2A or higher
Dimensions / Weight	24 x 64 x 67 mm / 90g

6.1.2 UMA-4 Module²

MEMS microphones	4 x Knowles MEMS with low noise buffer and high-performance modulator: • Low distortion: 1% @ 130 dB SPL • Sensitivity: -37dBFS @ 94dB SPL (1kHz) • Acoustic Overload Point (AOP): 132.5dB SPL • High SNR: 66 dBA and flat frequency response • RF shielded against mobile interference • Omnidirectional pick-up pattern Matched sensitivity for uniform response
Mounting	Plastic clamp for microphone mounting
Dimensions (mm) / Weight	172 x 180 mm/ 27g

² Based on MEMS manufacturer specifications



6.1.3 UMA-XL Module³

MEMS microphones

Up to 4 x Knowles MEMS with low noise buffer and high-performance modulator:

- Low distortion: 1% @ 130 dB SPL
- Sensitivity: -37dBFS @ 94dB SPL (1kHz)
- Acoustic Overload Point (AOP): 132.5dB SPL
- High SNR: 66 dBA and flat frequency response
- RF shielded against mobile interference
- Omnidirectional pick-up pattern

Matched sensitivity for uniform response

Dimensions (mm) / weight, interface module

24 x 64 x 67 mm / 80g

Dimensions (mm) / weight, MEMS module

4 x 20 x 18mm / 2g

³ Based on MEMS manufacturer specifications

6.2 FIRMWARE UPGRADE

miniDSP may occasionally provide an upgrade to the A2B firmware to enable new features.

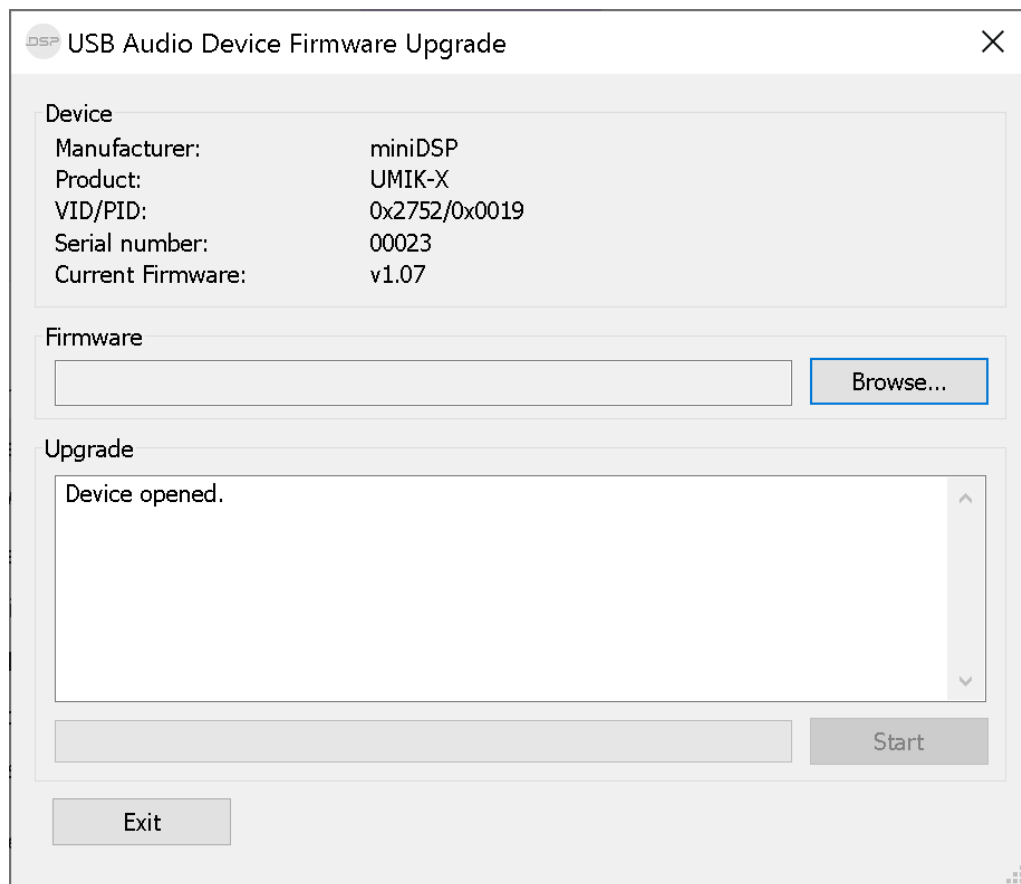
To upgrade the A2B firmware, first download the latest version of the UMIK-X software package from the **User Downloads** section of the miniDSP website, then extract it on your computer (on Windows, right-click and select “Extract All...”; on Mac, double-click).



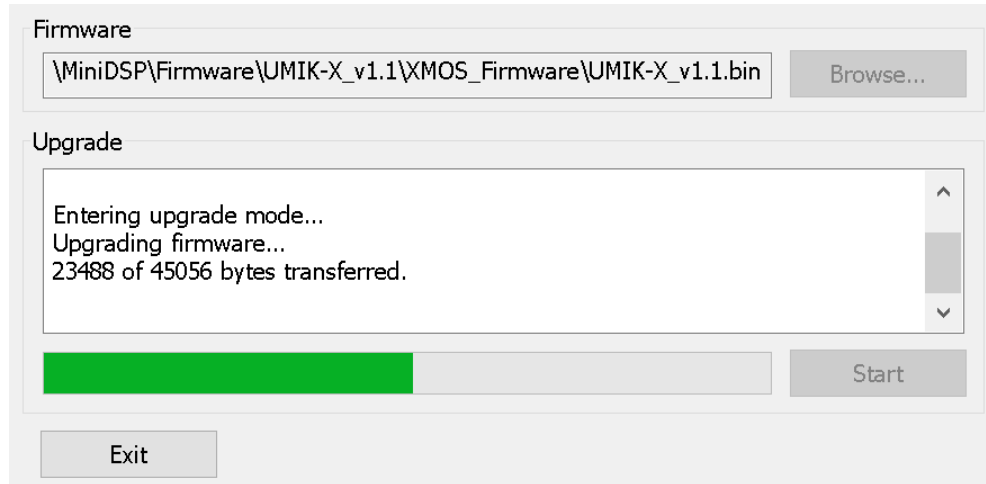
DO NOT DISCONNECT THE USB CABLE OR POWER FROM THE USB-A2B INTERFACE WHILE FIRMWARE UPGRADE IS IN PROGRESS. DOING SO MAY “BRICK” YOUR INTERFACE.

6.2.1 Windows

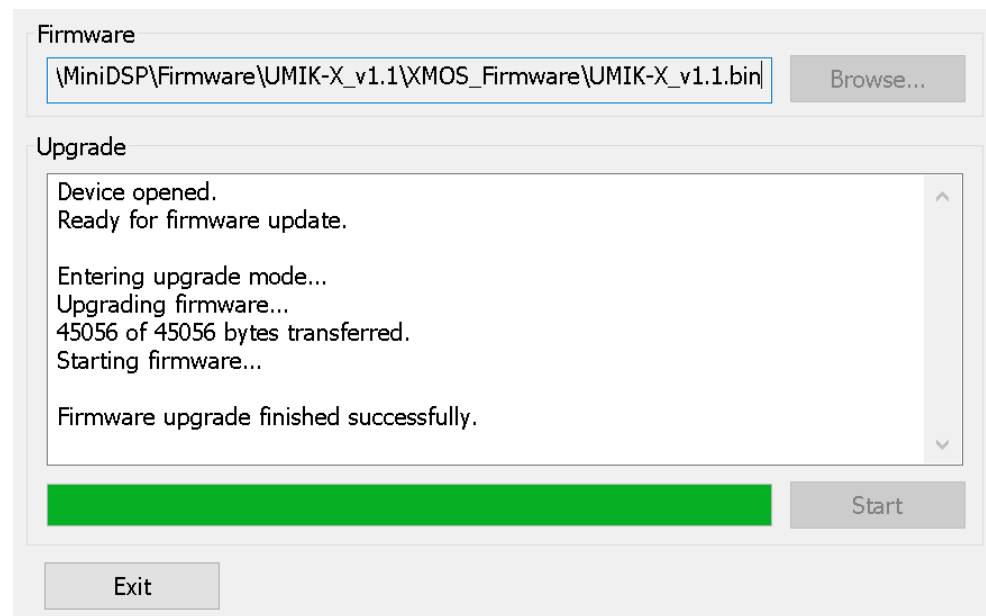
1. Connect the A2B interface to your computer via USB (if not already connected) and then connect its power supply.
2. Navigate to the **XMOS_Firmware\Firmware_Upgrade_Tools\Windows\miniDSPUAC2Dfu** folder of the software download.
3. Double-click on **miniDSPUAC2Dfu.exe** to run it. The application will start:



4. Click on the **Browse** button and select the firmware file from the **XMOS_Firmware** folder of the software download. It will have a name like **UMIK-X_v1.2.bin**. (The version number “v1.2” may change.)
5. Click on the **Start** button.
6. You will get a progress bar as the upgrade proceeds:



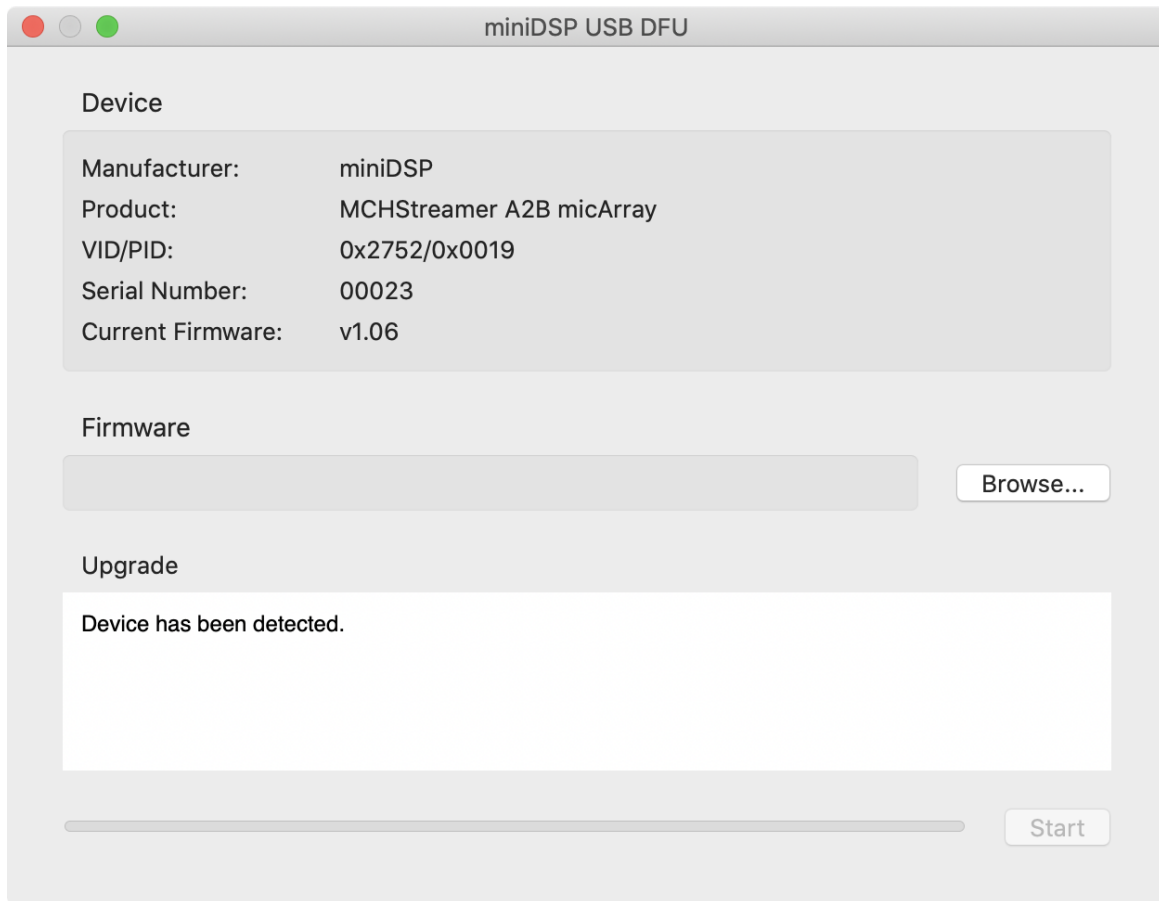
7. Once the firmware upgrade completes, you will see a message that the upgrade completed successfully:



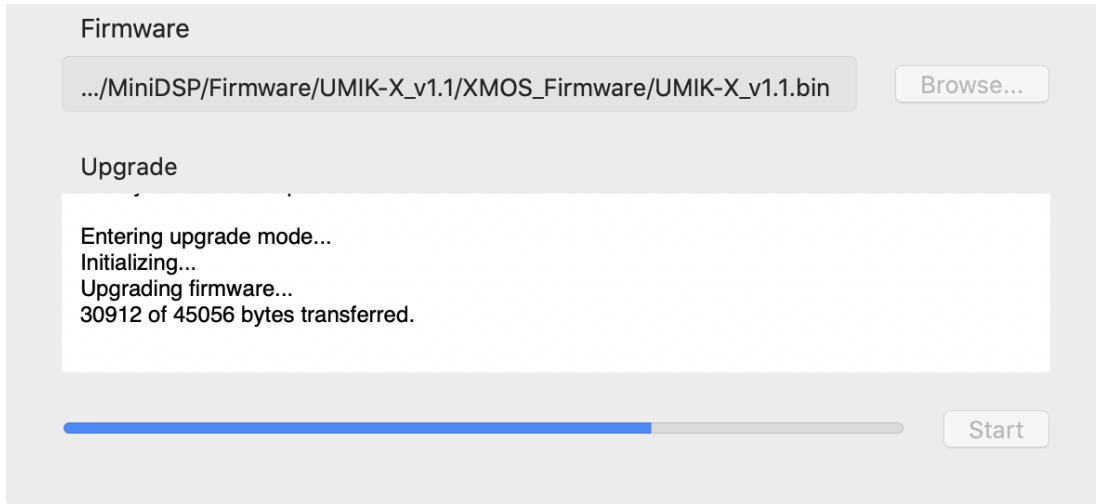
8. Click on **Exit**.
9. That's it! You're done. You can now use your UMIK-X again.

6.2.2 macOS

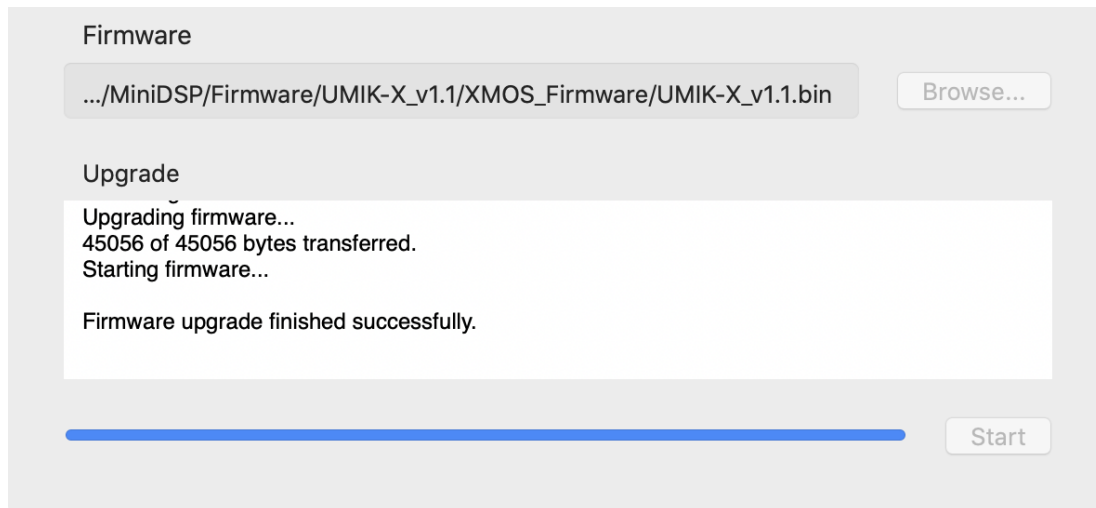
1. Connect the A2B interface to your computer via USB (if not already connected) and then connect its power supply.
2. Navigate to the **XMOS_Firmware/Firmware_Upgrade_Tools/Mac** folder of the software download.
3. Double-click on the .zip file to extract the firmware update software, then double-click on **miniDSP USB DFU.app** to run it. The app will start:



4. Click on the **Browse** button and select the firmware file from the **XMOS_Firmware** folder of the software download. It will have a name like **UMIK-X_v1.2.bin**. (The version number “v1.2” may change.)
5. Click on the **Start** button.
6. You will get a progress bar as the upgrade proceeds:



7. Once the firmware upgrade completes, you will see a message that the upgrade completed successfully:



8. Click on **Exit**.
9. That's it! You're done. You can now use your UMIK-X again.



6.3 OBTAINING SUPPORT

1. Check the forums on minidsp.com to see if this issue has already been raised and a solution or solutions provided.
2. Contact miniDSP via the support portal at support.minidsp.com with:
 - a. The product information.
 - b. A clear explanation of the symptoms you are seeing.
 - c. A description of the troubleshooting steps you performed and the results obtained.